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Survival Factors

- Locomotive Crashworthiness
- Emergency Preparedness / Response
- Associated Injury Causation

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Collision Dynamics

- Train 192 entered the Industry Track ~ 42 mph
- Collision with unoccupied standing train; propelled backwards ~ 217 ft
- Moving train deceleration ~ 5 mph/sec … normally survivable
- No loss of cab survival space
- Crew relatively uninjured / able to egress locomotive

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Emergency Response Timeline

- Collision occurred ~ 2:39 am
- Initial notification: 911 call, < 1 minute
- Fire / Rescue dispatched, < 1 min
- Fire / Rescue en route, < 1 min
- FD Chief – in hearing a ‘smell of chemicals’ radio call, ordered responding resources to hold / standby

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Emergency Response Timeline

- As FD Chief approaches scene,
  ~ 6 min / 1000 ft from accident site:
  - nearly overcome by chlorine fumes
  - forced to withdraw / regroup
- Intensity suggested chlorine gas was:
  - spreading rapidly
  - approaching critically toxic levels

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Emergency Response Timeline

- Recognized need for immediate mass evacuation
- Was able to recover from disorientation / near incapacitation
- Chief relocated to upwind site, < 13 min

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Emergency Response Timeline

- Marshaling personnel & equipment
- Establish Incident Command
- Requested Mutual Aid
- Activated Reverse 911 (shelter-in-place instructions)
- Initiated step for major evacuation

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Emergency Response Timeline

- Firehouse engulfed in toxic cloud – unable to retrieve needed equipment
- Personnel & equipment staging at Forward Command site, ~ 27 min
- All Aiken County fire / rescue placed on standby, ~ 34 min
- Request - all available SCBA

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Emergency Response Timeline

- NS faxed Wheel Report to the Bath FD; hand-delivered to FD Chief ~ 3:24 am:
  - contained basic train cargo info
  - Chief noted - was of limited value; didn't contain Haz Mat cargo emergency response / handling info
  - FD used *Emergency Response Guidebook*

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Emergency Response Timeline

- Steady stream of individuals observed departing residential development north of accident site, ~ 52 min
- 1st of 4 Decon Stations being organized, ~ 53 min
- FD Recon Entry Team in “Hot Zone” gains close access to wreckage site / info feedback to IC, ~ 54 min

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Emergency Response Timeline

- Firefighter Entry Teams organized / deployed, ~ 69 min (3:48 am):
  - SCBA & Level B / Pickup Trucks
  - Hot Zone / Search and Rescue
  - Quickly locate victims / transport
  - Rapidly recycle back into Hot Zone for another rescue load

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Emergency Response Timeline

- Search and Rescue continued until ~ sunrise (7:32 am):
  - FD successfully rescued those in Hot Zone who were not sheltered-in-place
  - S&R evacuation technique … particularly efficient / effective

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Emergency Response Timeline

- Emergency status stabilized ~ sunrise
- Evacuation sweep initiated by Aiken County Sheriff's Office:
  - mandatory evacuation / 1 mile radius
- ~ 5,400 persons
- 4 Emergency Shelters
- Evacuee return commences Jan 13

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Associated Injury Causation

- Coroner's Reports:
  - 1 train crewmember
  - 8 civilians

… exposure to chlorine gas

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Associated Injury Causation

- Emergency Response Considerations
  - FD arrived on-scene within minutes
  - forced to withdraw / regroup
  - S&R / Large Scale Evacuation in Level A or B - PPE + SCBA
- Many, if not all, the field fatalities occurred before FD arrived on-scene, or was able to execute S&R / evacuate

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Emergency Response Assessment

- Prompt dispatch of emergency response
- Employment of Incident Command
- Early Mutual Aid request / response
- Evacuation - recognition / execution
- Vigorously executed Search & Rescue / Decontamination

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Conclusion

- The execution of the emergency response to this accident was timely, appropriate, and effective.

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Train Crew Protection - Inhalation Hazards

- Freight Train crews survive collisions, then injured / perish by Haz Mat release:
  - NS Train 192; crew survived collision / exited locomotive, could not escape chlorine gas
  - Macdona, TX / June 2004; crew survived collision / exited locomotive, could not escape chlorine gas

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Train Crew Protection - Inhalation Hazards

- Emergency / Escape - Breathing Apparatus:
  - commercially available
  - ‘escape use’ approved in certain chemical atmospheres / 5-50 min.
  - required in some industrial applications (e.g. marine vessels)

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Conclusion

- Had the engineer of train 192 been wearing appropriate, fully functioning emergency escape breathing apparatus when he walked away from the collision site, he may not have succumbed to the effects of chlorine gas inhalation.

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